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Original Research

Unexpected effect of upper eyelid blepharoplasty on lid position

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Abstract

Aim: The study aims to evaluate upper eyelid position after upper eyelid blepharoplasty by measuring margin-reflex distance 1 (MRD1).

Material and Methods: Patients who applied to the Oculoplasty Clinic of our hospital and underwent upper eyelid blepharoplasty between January 2021 and March 2022 were retrospectively scanned. Patients whose preoperative and postoperative 3rd month photographs were obtained were included in the study. Patients who had simultaneous ptosis surgery, internal or external browpexy, fat pack removal, or botulinum toxin injection within the last 6 months were not included in the study. MRD1 was measured using digital photographs with the help of a special program, and the values before surgery and 3 months after surgery were compared.

Results: Thirty-eight eyes of 19 patients (12 female, 7 male) were included in the study. The average age of the patients was 65.1 ± 6.01 (56-78). While the mean MRD1 value was 2.374 ± 0.755 mm before surgery, it was 2.501 ± 0.772 mm in the 3rd month after surgery. This difference was found to be statistically significant (p=0.022).

Discussion: Anticipating a change in MRD1 following blepharoplasty surgery will facilitate a more accurate determination of postoperative eyelid position. A significant increase in MRD1 was observed in the 3rd month after upper lid blepharoplasty surgery, and it is recommended that this effect should not be ignored when planning surgery.

Keywords

Blepharoplasty, Dermatochalasis, Margin-Reflex Distance

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Introduction

In recent years, the frequency of upper eyelid blepharoplasty surgeries for cosmetic or medical reasons has been steadily increasing. Alongside this trend, patients' post-surgical expectations have also risen. The position of the upper eyelid is a result of the complex interaction of multiple forces. These include the delicate balance between eyelid muscles, mechanical forces such as dermatochalasis and brow ptosis, as well as afferent neurological tone [1, 2]. It has been traditionally accepted in upper eyelid surgery that the margin reflex distance 1 (MRD1) typically cannot be altered solely by blepharoplasty surgery [3]. However, there are studies, albeit limited in number, that suggest otherwise [4-7].

Blepharoplasty surgeries performed at our clinic are for medical reasons, often involving cases with visual field limitations. Hence, the consideration that the extent of skin removal might impede the visual field, specifically reaching a point where it would accumulate above the eyelashes, raised the query: "Might there be a rise in lid position upon removal of this conspicuous tissue?" This study was designed with this question in mind. The potential alteration in MRD1 post-blepharoplasty in this patient group could influence surgical outcomes, particularly in cases with mild ptosis, knowing the possibility of such changes postoperatively is important, as it may prevent additional procedures such as simultaneous ptosis surgery. The primary aim of this study, designed with this consideration, is to evaluate the upper eyelid position after upper eyelid blepharoplasty by measuring MRD1 and comparing it with preoperative values.

Material and Methods

Patients who underwent upper eyelid blepharoplasty at the Oculoplasty Clinic of our hospital between January 2021 and March 2022 were retrospectively reviewed. Patients with a history of botulinum toxin injections in the last year and those undergoing simultaneous ptosis surgery, internal or external brow lifting, or intervention on fat pads were excluded from the study.

Age, gender, and MRD1 values obtained from patients' medical records and digital photographs were recorded before surgery and at the 3-month postoperative follow-up.

Before taking a photograph encompassing the entire face with the patient seated, a round colored label with a diameter of 9 mm was placed between the eyebrows to serve as a reference when adjusting the measurement scale. Care was taken to ensure the frontalis muscle was not contracted. Image analysis was performed using ImageJ Software (ImageJ program 1.42; National Institutes of Health, Bethesda, MD), considering previous studies in the literature [8, 9].

Statistical analyses were performed using SPSS 25.0 software. The distribution of data was assessed using the Kolmogorov–Smirnov and Shapiro-Wilk tests. Descriptive statistics were used for demographic data; correlation analysis and paired samples t-test were performed for the evaluation of MRD1 before and after surgery. Pearson correlation coefficients were used to study the association between the two groups. A p-value of <0.05 was considered statistically significant.

Ethical Approval

The study was approved by the Ethics Committee of Ankara City Hospital (Date: 2023-12-17, No: E1-23-4565).

Results

A total of 38 eyes of 19 patients, 12 of whom were female (63.2%) and 7 male (36.8%), were included in the study. Table 1 shows patient demographics as well as preoperative and postoperative MRD1 measurements following blepharoplasty at 3 months. The mean age of the patients was 65.1 ± 6.01 years (range: 56-78). The mean MRD1 value was 2.374 ± 0.755 mm preoperatively and 2.501 ± 0.772 mm at 3 months

Table 1. Patient demographics along with preoperative and postoperative MRD1 measurements following blepharoplasty at 3 months.

Age	Gender	Preoperative right MRD1 (mm)	Postoperative right MRD1 (mm)	Preoperative left MRD1 (mm)	Postoperative left MRD1 (mm)
59	f	1.7	1.9	2.3	2.5
58	f	2.1	2.6	2.4	3
62	f	2.4	2.6	2.6	2.8
71	f	2.9	3	3	3.1
57	f	3	2.9	2.8	2.9
62	f	1.8	2.3	1.9	2.3
63	f	2.2	2.8	2.4	2.9
64	f	1.1	1.9	1.2	2.1
68	f	3.1	3.1	2.8	2.8
65	f	1.4	1.9	1.9	2.2
66	f	1.2	1.5	1.3	1.6
61	f	2	2.1	1.5	1.8
67	m	3.9	4.1	4.5	4.5
56	m	1.4	2.2	2.2	2.9
78	m	1.7	2.8	1.1	2.7
63	m	3.2	3.4	3.2	3.4
68	m	1.8	3.2	2	3.3
72	m	1.9	3	1.7	2.7
75	m	1.2	2.9	1.7	3

postoperatively, with this difference being statistically significant (p=0.022). Besides the statistical significance of the difference in MRD1 values preoperatively and postoperatively, there was a nearly perfect significant positive correlation between these values (r=0.909, p<0.001). No complications were observed in any of the surgeries.

Discussion

In recent years, the demand for upper eyelid blepharoplasty has been on the rise. At our clinic, this procedure is conducted not for cosmetic purposes but for medical reasons, with visual field limitations being the primary determinant. Therefore, it was thought that the mechanical effect of this prominent tissue, which reaches a level that piles up above the eyelashes, would be eliminated, allowing the levator and Muller muscles to lift the eyelid more comfortably. The position of the upper eyelid is a result of the complex interaction of multiple forces, including the delicate balance between eyelid muscles, the amount of dermatochalasis and brow ptosis, as well as afferent neurological tone [1, 2]. However, despite the assumptions that mechanical depressor effects decrease and the orbicularis oculi muscle (OOM) may weaken as a result of upper eyelid blepharoplasty, the net effects of mechanical-neurological interactions on eyelid position have not been definitively determined [3, 10].

In the study, which was designed with the idea that the possible change in MRD1 after upper eyelid blepharoplasty surgery would affect the results of the surgery, a significant increase in MRD1 was observed as a result of the evaluation of digital photographs before and 3 months after surgery.

Similarly, in the study by Tanju et al., statistically significant increases in MRD1 were observed following blepharoplasty surgery [5]. Additionally, Bunyada et al. emphasized that in their study, approximately 15% of patients experienced a decrease of >1 mm in MRD1 after upper eyelid blepharoplasty, with a higher likelihood of this decrease observed in those who underwent OOM resection. While upper blepharoplasty stands as a frequently conducted procedure in aesthetic surgery, consensus on the management of the OOM remains elusive. Although there are studies suggesting that OOM resection leads to a reduction in MRD1, it has also been noted that it does not create a significant difference in the long term [11, 12]. Since muscle removal does not offer additional benefits, preservation of the muscle is generally recommended [13].

In our study, the preservation of the OOM may have contributed to the observed increase in MRD1 rather than a decrease. When considering the explanation of MRD1 increase as the removal of mechanical effects of the skin tissue, it can be hypothesized that the OOM may exert an elevating effect on eyelid position upon relief of its own weight. However, due to its deeper location compared to the skin, its vectorial weight effect would be less than that of the skin. This is the author's own interpretation, and no studies have been found in the literature that examine these mechanical balances in terms of the surface area or weight of the excised skin or the OOM. However, interventions on the OOM have been associated with potential damage to deeper elastic fibers or even the levator aponeurosis [14]. This mechanism may explain the increased likelihood of MRD1 decrease with the excision of the OOM.

Anticipating a change in MRD1 following blepharoplasty surgery will facilitate a more accurate determination of postoperative eyelid position. Considering that cases performed in our clinic are primarily driven by medical necessity rather than cosmetic concerns, the unexpected increase in MRD1 can be explained as a result of the removal of mechanical weight exerting influence on the eyelid following anterior lamellar resection, allowing the levator and Muller muscles to lift the eyelid more comfortably. Particularly in cases with significant dermatochalasis where simultaneous ptosis surgery is also planned, it is important to consider this effect.

Limitation

One of the limitations of the study can be stated as the small number of cases. This was due to the fact that a single type of surgical method was chosen in order to minimize the factors that could affect the results, and cases were excluded from the study if additional procedures were performed during surgery. Another limitation can be considered as not evaluating the eyebrow position, but it has been shown before; in cases with dermatochalasis, changing the eyebrow position manually does not affect MRD1 measurements, therefore no change is expected after surgery [15].

In future large-scale studies on this topic, enlightening additional information could be obtained by examining the area or weight of the excised tissue along with assessing whether the OOM was excised.

Conclusion

A significant increase in MRD1 was observed at 3 months post upper eyelid blepharoplasty surgery, suggesting that this effect should not be overlooked during surgical planning.

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Scientific Responsibility Statement
The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and Human Rights Statement
All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or compareable ethical standards.

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Conflict of Interest
The authors declare that there is no conflict of interest.

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